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Wood for Future Generations: Economic Potential for Intensive Forestry in New England

Note: Lloyd Irland presented these remarks before the New England Section of the Society of American Foresters, meeting on March 9, 1983, in Burlington, Vt. The meeting itself was entitled "The Future of Forestry in New England and Eastern Canada." Irland's address appears in the *Proceedings of the New England Section of the Society of American Foresters,* 63rd Annual Meeting, a 148-page record of the event. You may request a copy of the proceedings (SAF Publication No. 83-05) from Dr. Peter Hannah, Department of Forestry, University of Vermont, Burlington, VT 05405. Enclose a check for $8.00 made out to "Green Mountain Division, Society of American Foresters." The *Newsletter* gratefully acknowledges SAF's permission to reprint.

A supply of wood was an immediate practical concern of the colonists who first settled New England's shores. Well before the Revolution, wood supply became a chronic, costly problem for the larger cities and their key wood-using industries. Wood for future generations was a distant abstraction: how to fill the woodshed for next winter was a real problem each year.

Today, we have far more wood than we need for this winter and next. But times are changing. After expanding for a century, our region's commercial forest area will be heading downward. An expected doubling of the wood harvest by the year 2030 raises serious questions about long-run sustainability if the current extensive management pattern does not change.

I will discuss a few key ideas about the economics of growing wood for future generations. To achieve this focus, I must omit nontimber values and a host of other important considerations.

To preview my conclusion: on large areas in our region, prudent landowners can make investments that will pay during their lifetimes while growing wood for future generations.

What Does Intensive Forestry Mean?

Intensity of forest management means the degree to which human effort — labor and capital — is combined with natural forces to affect forest conditions. The conditions of interest may be species composition, growth rate, regeneration, log quality, wildlife populations, or esthetics. At one extreme is the free windfall of natural old growth produced entirely by nature. At the other is the intensively cultured plantation, thinned every 10 years and fertilized, perhaps even fenced against hungry wildlife. We can apply the idea of management intensity to individual stands or to an entire property. The concept is really most interesting when applied to an entire property. On an intensively managed property, large areas will receive only extensive treatment.

Management intensity is usually spoken of in terms of the dollars per acre invested in treating a given stand. A more complete view recognizes that a higher level of annual cost is also frequently required, as are more frequent treatments over the life of a stand. An intensively managed stand might have less growing stock volume per acre than an extensively managed stand, though the wood would generally be of higher unit value.

Table 1 shows a number of more specific ways to describe management intensity on a given tract. Management intensity is a relative, not an absolute, concept and is described in different terms to fit the local need.

Table 1. Indicators of management intensity

Inputs
Number of stand entries per rotation
Foresters per acre
Investments per acre
Ratio of area in final harvest to total area treated each year
Proportion of clearcut areas planted; proportion of planted acres receiving selected or improved planting stock
Proportion of cuts on a marked-wood basis
Degree of detail of forest inventory, site maps, and stand prescriptions
Frequency of logging inspections
Proportion of yield from salvage / intermediate cuts
Forest condition
Growth / cut ratios by species
Proportion of yield by product: fuel, logs, veneer
Degree of regulation of growing stock by type, area, and age class
Log quality indexes; proportion of cull and dead timber
Results
Ratio between growth and inventory
Value growth and dollar revenues per acre
Effects on nontimber benefits
Return on investment yielded by the capital budget
Market value of the property
Shorter rotation ages
Growth rates compared to estimated potential yields

Why Intensive Management?

I don't have to convince foresters that a higher level of forest husbandry is generally a good thing. But why should more intensive management of New England's forests deserve a high place on the region's conservation agenda? Six considerations comprise a strong private and public rationale:

1. Rising wood harvest. — First, the market will demand more timber from our forests. The USDA Forest Service timber outlook suggests we will see a doubling of regional output by the year 2030. The current harvest is roughly 10 million cords (36 million m^3). Without a major improvement in management, double this figure cannot be produced on a sustained basis.

I am not saying, "Do better management because we will need more wood." I am saying the market is expected to generate a rising harvest level. To allow sustained output and also improve forest conditions will require more intensive management.

In the spruce-fir forest, the principal justification for intensive management is to partly mitigate the forthcoming shortfall in wood supply due to the budworm outbreak and the forest's imbalanced age structure.

2. Prime natural asset. — Forest land is one of New England's prime natural assets. It is clearly in the public interest to produce the highest possible yield of products and services from that asset regardless of whether it is in public, corporate, or individual ownership.

3. Jobs. — Rural areas of our region will continue to need stable manufacturing jobs. Our wood-based industry employs some 60,000 people processing New England wood (and some 40,000 processing wood, pulp, and paper from elsewhere). Normal technological progress reduces employment per cord of wood. In Maine from 1952 to 1979, lumber jobs per million board feet of sawlogs processed fell by 59 percent (to 13.3 jobs), and paper industry jobs per million cords cut fell by 28 percent (to 5,700).

Merely to stay even in jobs will require a number of economic changes, but improved quality and quantity of timber output will help significantly.

4. Income. — Better management and marketing will increase landowner income significantly, with resulting benefits to rural personal income, landownership stability, public revenues, and incentives for future forest husbandry. Today's harvest yields more than $150 million per year in gross income to landowners.

5. Trade. — A higher level of forest outputs will improve the regional and national balance of trade. The current regional wood energy use in residences alone is almost 4 million cords (14.4 million m^3). This displaces at least $400 million worth of heating oil imports and probably more. The region's excellent industrial base and location for wood product exports suggests a promising opportunity for those capable of organizing to take advantage of it.

6. Stewardship. — Finally, there is a stewardship or bequest motive. Our generation did not exactly inherit a well-tended, high-quality, regulated forest. So it should be easy to pass it on to the future in far better shape.

But with the current level of harvesting practice, and growing markets, it would be all too easy to degrade it further.

I know there are those among us who dispute the relevance of stewardship and bequest motives, both for individuals and for society. I do not expect the difference of opinion to be soon resolved. The question of "What has posterity done for me lately?" will always be with us.

Economic Potential for Intensified Management

Until very recently, New England foresters have faced their most difficult problems in simply marketing trees from the existing stock. Huge growth-cut surpluses, poor markets for low-grade and small trees, and declining real stumpage prices made New England an area where discussion of intensified management always meant "what they're doing in Georgia."

As a result, we lack basic tools and information for appraising New England's true potential for intensive management. In particular,

- Growth and yield tables for natural and managed stands are grossly inadequate. For several major timber types, the best we can provide is yield tables published up to 50 years ago for highly unrepresentative conditions.
- Except in limited areas, we lack a tested, mappable, and manageable site classification.
- Guidelines on costs and returns for particular practices in specific types are out of date, fragmentary, or nonexistent.
- Published information on the actual long-term biological and financial performance of managed stands and properties is scant.
- Published information on financial aspects of timber growing that can be used by the individual landowner is essentially nonexistent, though most foresters have their own personal toolkits of such information.

Because of past conditions, no one has thought it useful to use existing forest survey data to develop inventories of treatment opportunities, such as have been done in Ohio, Minnesota, the South, and the Douglas-fir region. Current overstocking, imbalanced age structure, poor species composition, burdens of cull trees, and past fire, logging, and insect and grazing damage all obscure the true future potential

for managed stands. These conditions may limit immediate treatment options and put the attainment of a desirable stand structure decades away.

Nonetheless, I am prepared to argue that the economic opportunities for intensified timber growing are substantial. Here's why:

1. Markets. — Timber markets are excellent and getting better. Real sawlog stumpage prices turned up in the 1960's and 1970's for many species, but pulpwood has been steady or down. Future inventory trends suggest continued price increases for spruce-fir. For low-grade hardwood, however, real prices will fall, but hardwood logs will be in growing demand.

As an example, in northern New England we have the strongest hardwood markets relative to inventory anywhere in the North. The energy demand for wood has virtually eliminated the large growth-cut surpluses in parts of southern New England.

Portions of the region still have poor markets, and this may not change soon. In those areas, opportunities will continue to be constrained. But outside of those areas, low-cost opportunities to upgrade quality of residual stands are everywhere.

2. Biological potential. — Basic biological potential is excellent. I will not try to recount why silviculturists say this is so. But the forest surveys show that New England contains 11.5 million acres (4.65 million ha) that can grow 1 cord/acre per year (8.9 m^3/ha per year) or better, without costly intensive management but simply if kept well stocked with desirable trees and in a regulated condition. This acreage alone, one-third of the region's woods, could grow our entire current cut. We have so much high-site-quality land that it will take decades to bring it into good condition. The idea that our region cannot grow wood as fast as some other places is simply false. Fully *3.5 million acres (1.4 million ha)* could grow 1.4 cords/acre per year (12.5 m^3/ha per year) or more.

Documented instances of planted conifers growing 1.5 to 2 cords/acre per year (13 to 18 m^3/ha per year) are common in New England and under similar conditions in the Lake States. Considering these yields, current costs, and expected stumpage price trends, such plantations are financially attractive for some landowners.

3. Economic opportunities. — Good site conditions alone do not make an investment opportunity. Few landowners are in a position to speculate on future pricing with planting and associated costs at the present level. What we seek are good sites that now support stands capable of yielding break-even or low-investment treatment opportunities to boost value growth on residual trees. These opportunities seem to occupy half or less of the high-site land.

A detailed economic assessment by the Forest Industries Council suggests that New England's good site conditions do indeed provide a large opportunity for profitable investment. To obtain the guesstimates in table 2, I have prorated the Council's estimates to New England. These treatments are expected to return 10 percent after tax in real terms on all incremental investments.

Table 2. Intensive management treatments identified by the Forest Productivity Committee, prorated to New England

	Acreage (million)	Initial investment ($ million)	Actual incremental yield (million ft^3/year)
Softwoods	1.0	29	56
Hardwoods	3.8	33	28
Total	4.8	62	84

The identified treatments on 4.8 million acres (2 million ha) would require an initial investment of $62 million and supply an incremental yield of about 1 million cords (3.6 million m^3), equal to 10 percent of the current cut.

Is such a program financially feasible? I think it is. The current net return to forest landowners in New England is certainly $75 to $100 million per year. And Treasury bills are now yielding well below 10 percent.

Whether a program like this can be implemented is another question. Do we have the thinning crews, available foresters with high-level skills, and logging crews capable of carrying out these treatments? How about the aware, investment-conscious landowners? Probably not.

If we were to spread the program over 20 years, it would take $3.1 million/year in investment capital. It would require treating 240,000 acres (97 000 ha) per year to a standard of treatment that is now being applied on a fraction of that acreage.

It would take years of work, planning, learning by doing, and some false starts to work up to this annual treatment level. But it can be done.

My Five Favorite Opportunities

Based on general experience, reading, and personal whim, I'd like to list a few favorite management intensification opportunities, just to make this discussion more concrete.

1. Upgrade current harvest practice. — Without doubt, the best way to boost future productivity is to be more careful about how we remove the 10 million cords (36 million m^3) we are now harvesting. On some 500,000 acres (202 000 ha) each year, trees are being cut. On some proportion, future productivity benefits; but on most of it, residual trees are banged up, soils are rutted, culls are left behind, regeneration is smashed. On some the landowner is left angry.

The best intensive management opportunity we have is to devote more professional skill to assuring that today's harvest is removed in a way that optimizes future productivity.

2. Landowner revenues. — Next, we should do much more to assure that landowners understand how much their wood is worth. And that they get paid what it is worth. Failures in this area severely compromise all our other efforts to promote management.

A forest owner of ordinary educational attainment and experience in financial matters would never think of taking the first offer on $20,000 worth of a listed corporate stock without checking the financial page. Yet, such owners do this every day with timber. Landowner failure to understand the value of timber is a serious barrier to forestry. And it's one that we as foresters can do something about.

3. Upgrade quality. — The market is telling us that pulpwood and cordwood are worth less and less in real dollar value each year to their owners. Under the right conditions, simply mowing the forest for biomass tonnage may be good economics. But for most owners, the best intensive management practice will be to treat stands to upgrade quality of trees now standing. This will often be part of timber stand improvement operations aimed at establishing good stocking of desirable trees.

The dollar returns due to size increases, shortened rotations, and growth in value can be tremendous.

This opportunity exists on good sites in virtually every major timber type in the region. Investments that increase tree size and quality, and that shift stand composition toward higher value trees, may pay off in 10 to 15 years.

4. Remove unproductive growing stock. — Consistent with producing trees of desired size and quality, the general objective is to hold the minimum amount of growing stock. This minimizes risk, helps regulate the growing stock, frees capital for investments in roads or in treating high-potential stands, and yields cash flow. This is a critical part of intensive management: it simultaneously removes low-earning assets and provides capital for reinvestment. This is no different than culling the ''cats and dogs'' from a stock portfolio.

5. Identify high-site, high-payoff stands. — Dollars spent on deciding which acres to treat are the highest payoff dollars of all. They help you avoid mistakes. These are usually the dollars spent for professional forestry help.

Plan a simple, low-cost extensive program for the low half of the sites on a given property. Put the investments in the best sites and stands.

You will notice that planting, fertilizing, and some other items are not on my list. For the typical landowner, planting is the worst available investment, unless the effort is heavily subsidized with someone else's money. The typical woodland property of reasonable size has better uses for capital than planting. Those larger owners whose circumstances make planting a sound investment do not really need my advice on the subject.

In Conclusion

This short talk has left out large parts of the intensive management story — investment criteria, price outlooks, taxes, why owners are not investing now, alternative futures for wood utilization, nontimber forest services, and what the best public policies ought to be. A strong social rationale for intensifying management clearly exists. Most compelling to me are the needs to promote stable rural employment and to leave a future forest in better condition than it is today. There is a growing base of applied knowledge on how to intensify management for each individual timber type.

Intensifying forest management in New England is now a good financial investment on millions of acres. Much of the needed effort simply consists of spending a bit more on planning, marking, and supervising current harvesting.

I can summarize my argument with one simple assertion: growing wood for future generations is not a matter of altruism but is an investment opportunity attractive to the average landowner concerned with prudently managing a portfolio of personal wealth. Just like in the stock market, risks are present, and careful planning and watchful supervision are essential.

Growing wood consumption and better stumpage prices have placed this generation of foresters in the best position to show the public the value of better forest husbandry. What will we do with that opportunity?

Lloyd C. Irland — State Economist for Maine
Augusta, Maine

Northeastern Area, State and Private Forestry Looks Ahead

''Post-CANUSA.'' ''1985-and-beyond.'' ''Transition planning.'' That's the game these days for farsighted managers.

On March 30-31, the Durham Field Office of the Northeastern Area (NA), State and Private Forestry, hosted a meeting to look ahead, beyond CANUSA. Dan Kucera of the NA-Forest Pest Management Staff (FPM) in Broomall, Pa., and Dave Grimble, Applications Coordinator from CANUSA-East, convened the session. Meeting participants included Mel Weiss, Field Representative; and Imants Millers, Dennis Souto, and Lew McCreery of the FPM Staff; Ken Lancaster, Forest Management Staff; Dave Schumann, Resource Use Staff; Bob Ford from the

FPM Staff at St. Paul; Dave Funk, Northeastern Station Assistant Director; and Mel McKnight from the CANUSA Program in the Washington Office.

The objectives for the meeting were to identify information and technology transfer activities that would need to be continued after termination of the CANUSA Program, and to develop cost estimates for projects subsequently to be proposed to the Washington Office for funding. These objectives were achieved, after a thorough review of the status of technology transfer activities planned by CANUSA-East and NA in 1983 and 1984.

The success of the CANUSA Program will be gauged by the application of new and improved technology by resource managers in the next few years. Aggressive efforts by NA and cooperating State agencies will yield dividends from the CANUSA investment.

CANUSA/Gypsy Moth Host-Insect Interaction Workshop

On April 5-7, 1983, 25 CANUSA and gypsy moth investigators met in New Haven, Conn., to discuss the current status of host-insect interaction research. This meeting was planned in cooperation with the Northeastern Forest Experiment Station's newly designated Center for Biological Control of Northeastern Forest Insects and Diseases. The April meeting was a followup to a similar session held in February 1980, to discuss host-interaction relationships of the budworms and to coordinate research.

The 1980 meeting, organized by CANUSA investigator William Mattson, was held at the North Central Forest Experiment Station headquarters in St. Paul, Minn. This year's meeting of the two groups of investigators was held to share information, identify common research elements, and plan future investigations that might be cooperative efforts. Bob Talerico, Mike Montgomery, and Bill Wallner planned this workshop. Proceedings will be published in late 1983.

General Session

The opening session was devoted to welcoming remarks by Northeastern Forest Experiment Station Director Denver P. Burns, and CANUSA Program Leader Melvin E. McKnight. Bill Wallner described the plans for the Center for Biological Control. This

Figure 1. Those foliage folks — John McLean and Tony Thomas — checking over their data.

Figure 2. Chatting in front of the CANUSA-East display are Geral McDonald, Russ Mitchell, and Mike Wagner.

address was followed by presentations on the gypsy moth and spruce budworms, which provided background information for the technical discussions to follow. Bill Wallner and Bob Talerico described the similarities of the gypsy moth-spruce budworm systems, and Dave Houston and John Witter described the stand characteristics of forests susceptible to the gypsy moth and budworms.

Technical Sessions

The first technical session began with a series of papers that examined ways for measuring consumption and feeding preferences. Mike Montgomery reported on nitrogen consumption and utilization by gypsy moth and the spruce budworm. Mike Wagner described western spruce budworm food consumption and the effects of host species, host vigor, and foliage chemistry. Next, Paul Albert reported on the physical and chemical basis of host-plant selection by the spruce budworm. George Strunz described a joint project with Dave Leonard and Bill Bentley that examined plant materials for antifeedants for the spruce budworm.

Chemical factors and foliage quality were the themes for day two. Bill Mattson described the influence of foliar nutrition on performance of the spruce budworm. He was followed by Marty Lechowicz, who reported on leaf quality and host preference in northern deciduous forests. Next, Harry Valentine discussed the influence of herbivory on the net rate of increase of gypsy moth abundance by modelling. Jack Schultz followed with the effects of defoliation on the chemistry of red oak leaf tannin. Thakor Patel hypothesized on the biochemistry and physiology of embryonating eggs and early developmental stages of spruce budworms. Mike Schmitt reported on a joint effort with Miro Czapowskyj, Doug Allen, and Ed White that examined organic and inorganic foliage nutrient levels and spruce budworm fecundity. Roy Beckwith described his examination of western larch as a host of the western spruce budworm. The day concluded with John McLean reporting on a comparison of elemental profiles of the western spruce budworm and host foliage.

The next session examined the implications of host-insect interactions for silvicultural management. Dave Fellin described the effects of fertilization in western larch stands on the abundance and behavior of western spruce budworm in Montana. Geral McDonald followed with Douglas-fir progeny testing for resistance to western spruce budworm. Roy Shepard described his work with the interaction between bud and insect phenology. Tony Thomas reported on foliage consumption by sixth-instar spruce budworm larvae feeding on balsam fir and white spruce. The technical session concluded with Rich Fleming giving the group a modeller's perception of foliage quality and its effect on spruce budworm populations. This was followed by a general group discussion of research needs for future work on foliage quality and host-insect interactions.

Late one afternoon the participants adjourned early and were treated to a tour of the Forest Service's Hamden lab. Several staff members were available to discuss their work and show laboratory experiments and rearing facilities.

The proceedings of this workshop will be published and should be available for distribution in late 1983. An announcement will appear in a future *Newsletter*.

Bob Talerico — Research Coordinator
CANUSA-East
Broomall, Pa.

Figure 3. From the left, Janet Searcy, John Witter, Dan Kucera, Doug Allen, Dave Grimble, and Bob Talerico.

Authors of the Eastern Management Manual Meet in East Lansing

Canadian and American coauthors of chapters in *Managing Spruce Budworm in Eastern North America* joined with Program Management for an open-ended meeting on content of the book. Gary Simmons was our unofficial host for the meeting, which was held on the campus of Michigan State University during the first week in May.

Participants received copies of chapters shortly before the meeting, with Management's request to be ready to make suggestions on revising, eliminating overlap, and spotting noticeable gaps that needed filling in. The organizers of the meeting had not put together such an event in the past, and we all considered the possibility that nobody would have read his/her homework or that authors would be reluctant to tear into one another's prose in public. These fears proved groundless: participants were well prepared and the discussion groups were cordial and productive. At the end of the meeting, each chapter representative gave Management a copy of the text with revisions marked for reediting and retyping.

The technology transfer folks at Michigan State and The University of Michigan (Gary Simmons, Bruce Montgomery, and John Witter) organized a Technology Transfer (TT) presentation for Thursday morning. Included were talks on the transfer process and showings of the group's videotapes on silviculture and integrated pest management. Attendees had two chances for hands-on education, with John Witter discussing his workshops on aerial observation of defoliation, complete with stereoscope practice, and a side trip to the MSU entomology computer room.

Ron Stark and Russ Mitchell, from CANUSA-West Program Management, attended the meeting in preparation for the assembly of the western component's three management-oriented books.

Finally, organizers for the 1984 International Symposium met separately at the end of the authors' meeting, to discuss symposium format and content and to nominate possible speakers for the synthesis

Figure 4. Chandra Nigam, Maritimes Forest Research Centre, Fredericton, studies a CANUSA brochure from a tableful of products of the Michigan State-University of Michigan cooperative technology transfer effort.

sections and workshops. When formal invitations have been extended and accepted, the *Newsletter* will publicize details. In early summer, CANUSA investigators will be polled by mail to determine subject areas for which there is popular demand, and these will be the topics for afternoon workshops during the symposium.

Janet Searcy — Information Coordinator
CANUSA Program
Washington, D.C.

Barrel-Beaters for Budworm

You don't have to be a CANUSA-funded investigator to come up with good ideas about budworm. An employee from Forest Service Region 1 (Missoula, Mont.) has received a cash award and Servicewide recognition for inventing a device to determine lepidopteran larval populations on a branch of a sampled tree. Kenneth Gibson's barrel-beating apparatus is a faster and more efficient way to count western spruce budworm larvae.

Gibson notes that because each person doing the counting can inspect more branches in a given period, with less fatigue, fewer people are needed to do the job. His suggestion, part of the Forest Service's IDEAS program, has been adopted for optional use nationwide.

As the diagram shows, a barrel is placed on a stand to which has been attached a tractor funnel and a jar lid. The funnel permits a much larger hole in the barrel than just the jar alone, so field crews can brush larvae into the jar faster. The vertical position of the barrel makes beating easier and less time consuming and allows the branch inspector to maintain a more comfortable position during the process.

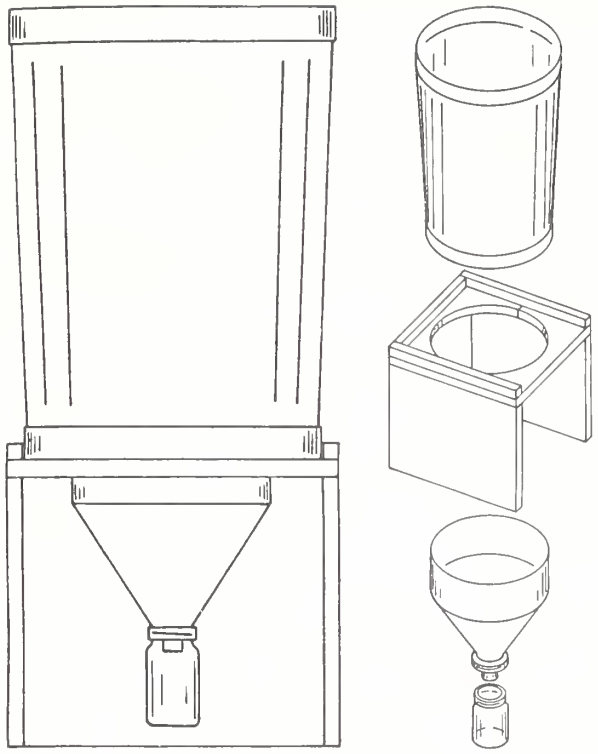

Figure 5. Profile and cutaway views of Kenneth Gibson's barrel-beating device.

In the Family

On May 18, the U.S. Department of Agriculture honored CANUSA-funded investigator Albert R. Stage with the Superior Service Award for his contributions in scientific research. Only 7 USDA employees received the award in this category nationwide, and among all 65 Superior Service recipients, only 10 were Forest Service employees. To Al, and his home Station, the Intermountain Forest and Range Experiment Station, we extend our warmest congratulations.

Items from the Press

Spray chemicals appear safe. — Fenitrothion, Matacil and other chemicals being used in the province's spruce budworm spray program appear at present not to be cancer causing, scientists investigating potential environmental causes of cancer in New Brunswick reported Tuesday.

In an interim report presented to Health Minister Charles Gallagher, William Spitzer, chairman of the task force on the environment and cancer, said there is no evidence to suggest Fenitrothion or Matacil, two active agents used in the program, are carcinogenic. Non-active agents studied also showed no cancer-causing potential, the report stated.

The interim report, however, suggested continued study of most chemicals involved in the spray program and recommended the government agree to fund five interrelated epidemiologic studies.

Mr. Gallagher said in light of the report he sees no reason at present to interfere with the formulations recommended for this year's spray program.

The Health minister said the government had reserved decision on whether to pursue the recommended studies, but he noted additional funding for the present study group might be included in the upcoming provincial budget.

The task force has been funded to $150,000, Mr. Gallagher said. Dr. Spitzer reported that $122,000 of the budget had been spent to date and said the remaining $28,000 would probably cover costs which will be incurred from now until the date of the committee's next report.

The Health minister said he expects another report from the group in about two months.

The task force was commissioned with the mandate to render a final report by the fall of 1983. However, Dr. Spitzer said Tuesday the group had requested Mr. Gallagher consider extending the mandate into 1984.

The Department of Health commissioned the study into the environment and cancer and a sister work on the environment and human reproductive outcomes (birth defects, miscarriages and still births) on the recommendation of an earlier task force which investigated a possible link between the budworm spray program and Reyes Syndrome. That task force was chaired by Dr. Spitzer.

Study to date shows New Brunswick's cancer rate is 16 percent higher than that of Nova Scotia, Dr. Spitzer said. But the mortality rate (from cancer) in Nova Scotia is nine percent higher than that of New Brunswick.

Saying further investigation is necessary, the report suggested a correlational analyses of cancer incidence and mortality be performed. In order to ensure the validity of cancer statistics, it recommended a cancer ascertainment population survey. Details of all cancer cases in New Brunswick and Nova Scotia from 1969 onward would be obtained from original hospital records.

Case control studies, to test suggested theories about the possible effects of the spray program should also be carried out, the report recommended. An exposure assessment, which would give researchers a bank of information about various areas' exposure to the spray, should also be compiled, it said.

The task force recommended non-active ingredients used in the spruce budworm spray program be given the same rigorous toxicological evaluation as pesticides since they too are disseminated into the environment.

Testing commissioned by the task force into the toxicity of Atlox 3409F, Dowanol TPM, Cyclosol 63, 585 oil did not suggest carcinogenic potential, the report stated.

The task force did express some reservations about the use of 585 oil. ''. . . considerable batch-to-batch variation in its aromatic hydrocarbon content raises questions about its safety.''

Dr. Paul Newberne, professor of nutritional pathology at Massachusetts Institute of Technology, noted toxicity testing had only been done on single ingredients to date. The toxicity of formulations will also have to be examined, he said.

The task force favored the use of simple formulations comprised of substances with known toxicity over complex compounds for the spray program.

In addition to its suggestion about non-active agents, the task force recommended consideration of a system of periodic re-registration of substances disseminated into the environment which have potential implications on human health. Standards of toxicological evaluations should be reviewed and modified as required to keep them in line with advancing scientific knowledge, the report said.

The report also recommended that the exposure data base proposed for the correlational and case control studies be maintained as a permanent resource to facilitate any future surveillance of this nature.

(Daily Gleaner — April 27, 1983)
Fredericton, N.B.

Pheromone tests. — Could perfumed confetti sprayed from airplanes end the spruce budworm's annual banquet on the spruce trees in New Brunswick?

Researchers at the University of New Brunswick are optimistic.

William Seabrook, a biologist studying pheromones, the sex attractant given off by the female budworm, has recorded an 85% reduction in the mating of the forest pest in all of his experiments so far. The pheromones would be distributed on small one-eighth inch biodegradable chips.

''It's going very, very well,'' Dr. Seabrook said in an interview. ''The experimental results are everything we could hope for, you could say.''

Pheromones are used by the female budworm to attract the males. A synthetic pheromone sprayed among the budworm spoils this mating process, thereby reducing the populations, Dr. Seabrook said.

(Daily Gleaner — March 3, 1983)
Fredericton, N.B.

Budworm control. — In spite of Mr. Ouellette's advice, Quebec chooses chemical spraying. — The Quebec government has authorized the Ministère de l'Énergie et des Ressources (MER) to conduct aerial spraying operations using chemical insecticides to control the spruce budworm, contrary to the recommendations made by Mr. Adrien Ouellette, Minister of the Environment, two weeks earlier.

Mr. Ouellette did succeed, nonetheless, in having the provincial cabinet prohibit the spraying of chemical insecticides that had been planned for the period from '84 to '86; this will force the MER to develop new intervention strategies to control this number one pest of Quebec's forests and to submit these strategies to the public hearing process again.

According to senior officials, Mr. Ouellette had recommended to the provincial cabinet that only the biological insecticide, *Bacillus Thuringiensis* (BT) be used in 1983, and only in areas where spraying would be inevitable in the short term. The Minister agreed on this point with the principal conclusions of the Bureau d'audiences publiques sur l'Environnement (BAPE), which dealt with this issue last fall as part of a province-wide consultation.

The MER must deal with certain conditions imposed by the new order. It must spray at least 60,000 hectares of forest with BT, including an experimental zone that will be monitored by the two departments in question. Mr. Ouellette was planning on an area at least three times larger. In his scenario, chemical spraying would have been reserved exclusively for the MER's administrative zones 11, 12 and 32. The order that was finally passed reverses the proportions somewhat.

The Minister of the Environment also proposed a safety zone of 5 km around inhabited areas, whereas the order maintains the standard of one kilometre around inhabited areas for the use of BT and three kilometres for the use of insecticides.

The preamble to the order remains the same as the one in the project submitted by Mr. Ouellette although its conclusions have been changed. It reads that the MER's program cannot be authorized as such because of the conclusions of the Bureau d'audiences, and that the Minister is in agreement with these conclusions, based on the environmental analysis.

''I do not intend to give up,'' Mr. Ouellette said yesterday. ''For me, this is only the beginning and I intend to continue my discussions and actions on the matter. The use of biological insecticides and the like seem to be the way for the future and all our efforts should be directed toward that goal.''

(Le Devoir — April 29, 1983)
Montreal, Que.
(Translated from French)

Spraying to control the spruce budworm begins. — The Ministère de l'Énergie et des Ressources will start spraying fenitrothion to control the spruce budworm today and continue until May 15, weather conditions permitting.

The purpose of this early operation is to decrease the very severe infestation of budworms in certain stands in eight blocks of softwood forest in eastern Quebec.

According to the MER, the infestation is so severe that if spraying is not done immediately, the extremely high concentration of budworms per tree will result in complete destruction of all new buds and, within a short time, the death of the trees.

The forest blocks that will be sprayed are block 103, fifteen miles east of Cabano; block 104, fifteen miles south of Rivière-du-Loup; block 108, fifteen miles south of Saint-Pacôme; block 204, twenty miles southeast of Rimouski; block 310, twenty miles southeast of Matane; block 312, fifteen miles southeast of Méchins; block 315, five miles east of Causapscal; and block 401, ten miles northwest of Chandler.

The MER said that the spraying was being done with three DC-4 aircraft especially equipped for this type of work. The aircraft will be making a total of twenty trips between 6 and 8:30 in the morning and 6 and 8:30 in the evening from Rivière-du-Loup and Mont-Joli airports.

The MER also said that the spraying will be done only if weather conditions are such that it can be done with maximum effectiveness.

The spraying will be done when winds are less than 12 km/hr, it is not raining at the time of spraying, and there is no thermal turbulence caused by excessively warm weather.

(Le Soleil — May 5, 1983)
Quebec City, Que.
(Translated from French)

Aerial spraying to control the budworm — Bad weather delays the spraying period. — Quebec's Ministère de l'Énergie et des Ressources (MER) announced yesterday that it was delaying the beginning of the spraying of chemical insecticides to control the spruce budworm because of bad weather which should have delayed the development of larvae.

Meanwhile, some 200 demonstrators gathered in front of the Rivière-du-Loup airport, where the first aircraft were to take off, to protest against the chemical spraying program. About fifteen local and outside groups took part in the demonstration.

Last week, the Quebec government authorized the spraying proposed by the MER in spite of the recommendations of Mr. Adrien Ouellette, Minister of the Environment. Mr. Ouellette supported the recommendations of the Bureau d'audiences publiques sur l'Environnement which had carried out public consultations on the subject.

Yesterday's demonstration was organized by the Comité d'étude sur les produits toxiques in conjunction with the Aboiteaux CLSC. The absence of the aircraft was interpreted by many as a strategy intended to make the demonstration somewhat less conspicuous.

For its part, the Association professionnelle des biologistes du Québec yesterday described the government's decision to authorize the spraying as disappointing. It also maintained that the government order obtained by the MER to take action is full of ambiguities and uncertainties.

Mrs. Claudette Journault, President of the Association, said that the government has a moral obligation to make a firm, immediate commitment to a forest management policy that does not perpetuate, but attacks the causes of the budworm problem. In this sense, the conclusions of the Bureau d'audiences publiques sur l'Environnement seem more promising.

Mrs. Journault fears that in putting off until next year the policy reversal suggested by the BAPE, the government is counting on the dispersal of the citizens who have a deep commitment to the public hearing process. She added that this government decision also goes against several acts passed by the government in the areas of the environment, community planning and development.

(Le Devoir — May 6, 1983)
Montreal, Que.
(Translated from French)

Recent Publications

Dave Grimble released six new Data Fact Sheets this spring: "New Tree Marking Paint," "Spruce Budworm Impact in Michigan's Upper Peninsula," "A Large Capacity Pheromone Trap," "Spruce Budworm Pheromone Traps," "Favorable Soils and Microenvironments for White Spruce," and "Sources of Materials for Spray Deposit Assessment"

For copies, write Dave at CANUSA-East, USDA Forest Service, 370 Reed Road, Broomall, PA 19008.

Pacific Southwest Forest and Range Experiment Station, 1960 Addison Street, Box 245, Berkeley, CA 94701, can supply

Markin, George P. "Drift of insecticidal spray by cold air drainage winds in western mountains." Res. Note PSW-360. Berkeley, CA: USDA Forest Service; 1982. 6 p.

Ferrell, George T., and Robert F. Scharpf. "Stem volume losses in grand firs topkilled by western spruce budworm in Idaho." Res. Pap. PSW-164. Berkeley, CA: USDA Forest Service; 1982. 10 p.

Markin, George P., and David G. Grimble. "Reldan insecticide field-tested on western spruce budworm, Payette National Forest, Idaho, 1977." Res. Note PSW-361. Berkeley, CA: USDA Forest Service; 1982. 7 p.

From the Forest Service's Southwestern Region, State and Private Forestry, Forest Pest Management, 517 Gold Avenue, SW, Albuquerque, NM 87102, you may request

Telfer, William G. "Western spruce budworm suppression and evaluation project using carbaryl — 1977. Santa Fe National Forest and Jemez Pueblo Indian reservation, New Mexico." Prog. Rep. 6. Albuquerque, NM: USDA Forest Service; 1983. 17 p.

The Pacific Northwest Forest and Range Experiment Station, 809 NE 6th Ave. Portland, OR 97232, has released

Twardus, Daniel B., and Martha H. Brookes. "A decision-support system for managing western spruce budworm: report from a workshop." Admin. Rep. Portland, OR: USDA Forest Service; 1983. 18 p.

With a prepaid purchase order for $8.00 Canadian, you may request a copy of "Aminocarb: the effects of its use on the forest and the human environment," NRC publication number 18979. This document is available from Publications, NRCC/CNRC, Ottawa, Ont. K1A 0R6.

Other reports of interest from various locations are as follows:

From the Forest Pest Management Institute, Box 490, Sault Ste. Marie, Ont. P6A 5M7, File Report No. 47 has been released for limited distribution:

Sundaram, K. M. S., J. Feng, R. Nott, and C. Feng. "Environmental chemistry studies on Matacil® 180F formulations following their semi-operational applications over a New Brunswick forest during 1982." No. 47. January 1983.

From Forest Protection Limited, P.O. Box 1030, Fredericton, N.B. E3B 5C3, you may request

Wiesner, C. J., J. B. Addison, and P. J. Silk. 1981. "Atmospheric photochemistry of Fenitrothion and Matacil." Technical Report 80/T/1 (NBRPC, RPC Rep. No. C/80/108, Job No. 6130).

Addison, J. B., P. J. Silk, C. J. Wiesner, and G. W. Henderson. 1981. "Measurement of vapour pressure and volatility from foliage of Fenitrothion and Aminocarb." Technical Report 80/T/2 (NBRPC, RPC Rep. No. C/80/194, Job No. 6131).

Knox, Sharon. 1981. "Aerial evaluation of damage from spruce budworm attack in New Brunswick–new methodology–1980." Technical Report 80/T/3.

Steel, Victor. 1983. "Results of the 1980 Woodlot Protection Project with *Bacillus thuringiensis kurstaki* in New Brunswick." Technical Report 83/T/2.

Webb, F. E., and H. J. Irving. 1982. "My Fir Lady: The New Brunswick production with its facts and fancies."

And abstracts from the New Brunswick Spray Efficacy Research Group (NBSBERG) workshop held in Toronto, Ontario, November 2-3, 1982, have been compiled by C. J. Wiesner, NBSBERG Coordinator, Research and Productivity Council, P.O. Box 6000, Fredericton, N.B. E3B 5H1. Write to him at the above address for copies.

To get more information or to have your name added to the mailing list for the *Newsletter*, contact

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